Soft-Rotator Coupled Channels Global Optical Potential for A=24-122 Mass Region Nuclides up to 200 MeV Incident Nucleon Energies

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Coupled-channels optical model with coupling built on nuclear wave functions of the Soft-rotator nuclear Hamiltonian was used to analyze available experimental optical interaction data with A=24-62 mass nuclides. Necessary Soft-rotator nuclear Hamiltonian parameters of even-even nuclides in the mass region considered were found to describe observed low-lying collective levels as members of the G. S.; $K=2^+$; $n_{\beta_2}=1$, $K=0^+$ and $K=0^-$ negative parity bands. Search option of coupled-channels optical model code OPTMAN was used to find individual optical potential parameters allowing best fit of available experimental data both for neutrons and protons simultaneously. Potential used, considers dispersion relationship as proposed by Delaroche *et al.*, imaginary components equal zero at Fermi energies - property stemming from nuclear matter theory and high-energy saturation consistent with the Dirac phenomenology. Lane model with the Coulomb correction term proportional to the derivative of the rest real potential energy dependence was used to describe neutron-proton potential difference. We found, that all the available experimental optical data (s- and p-wave strength functions, scattering radius, total cross sections, angular distributions of elastically and inelastically scattered nucleons and reaction cross sections) for nuclides with A=24-62 can be described with good accuracy using optical potential with the smooth dependencies of potential values, radii and difusenesses (imaginary volume potential geometry is considered to be equal real potential one), while individual properties of the nuclides are accounted by individuality of the nuclear Hamiltonian parameters, Fermi energies and deformations.

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